

# **Functional Requirements Document (FRD) for the Marine Corps Distance Learning Program Learning Management System (LMS)**

**October 2000**

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## **1.0 SCOPE**

### **1.1 Background**

The Marine Corps Distance Learning Network (MarineNet) provides Marines with global access to standardized electronic training and education resources. MarineNet will efficiently and effectively deliver and manage all distance learning products. The scope of the MarineNet program is centered on three distinct domains: (1) content development, (2) distribution infrastructure, and (3) management infrastructure. The Learning Management System (LMS) product that meets the requirements for student and courseware management will be a significant element of the management domain.

The LMS will provide the capability to:

- Manage, distribute and present instructional courseware
- Manage, collect and store student information
- Assign and schedule instructional resources
- Evaluate student performance through on-line testing and exercises
- Collect and present system reports

### **1.2 Purpose**

The Functional Requirements Document (FRD) defines the functional requirements for a commercial-off-the-shelf (COTS) LMS software product which will manage student data and interactive courseware access as part of MarineNet. This document serves as a basis for mutual understanding between the user community, the COTS software vendors, and system test developers. It provides the basis for development of criteria for system tests on candidate COTS products. Subsequent to product evaluations, it should serve as a basis in determining the required areas and elements of necessary customization of the selected products to better meet the needs of the Marine Corps and estimate accompanying costs.

### **1.3 References**

1. The MITRE Corporation document, "Marine Corps Distance Learning Program Analysis of Alternatives, Initial Assessment Report," 30 September 1998. MITRE Washington C3 Center, McLean, Virginia.
2. The MITRE Corporation document, "Notice to Industry Marine Corps Distance Learning Network (MarineNet) Computer Managed Instruction (CMI) Requirements," undated.
3. The MITRE Corporation document, "Marine Corps Distance Learning Program Learning Management System (LMS) Compatibility Assessment, Phase I, Single Point of Presence LMS Environment," 24 October 1999.

4. Naval Postgraduate School Report, "The Software Assessment for United States Marine Corps MarineNet Learning Management System," October 1999.
5. Airline Industry CBT Committee (AICC) Guidelines and Recommendations:
  - a. AICC CMI Subcommittee Document No. CMI001, "CMI Guidelines for Interoperability," Revision 2.0, 1 February 1998.
  - b. AICC Guidelines and Recommendations (AGR) 010, Web-Based Computer-Managed Instruction version 1.0, 29 September 1998.
6. Naval Air Warfare Center Aircraft Division, Special Communications Requirements Branch document, "MarineNet System Design Description for the United States Marine Corps Distance Learning Program," 17 March 2000.
7. Naval Air Warfare Center Aircraft Division, Special Communications Requirements Branch document, "Software Requirements Specification for the MarineNet Block II System," 13 June 2000.
8. Naval Air Warfare Center Aircraft Division, Special Communications Requirements Branch document, "Concept of Operations for the Deployed Learning Resource Center," 19 September 2000.
9. Naval Air Warfare Center Aircraft Division, Special Communications Requirements Branch document, "System/Subsystem Specification for the Distance Learning Center Internet TEPOP," 28 July 2000.
10. Operational Requirements Document (ORD) for Distance Learning; Change 1 (No. TNG 1.23).
11. Advanced Distributed Learning Initiative document, "Sharable Courseware Object Reference Model (SCORM)," Version 1.0, 31 January 2000.

#### **1.4 Terms and Abbreviations**

This paragraph provides a list of terms or acronyms that may be unique to this document or the Marine Corps Distance Learning Program initiatives.

**ALC**                   Area Learning Center. Geographically diverse sites, generally located at major installations, designed to be the primary delivery point for Distance Learning courseware to the operational Marine Corps population.

**AU**                    Assignable Unit. The smallest element of instructional content that a student may be routed to by a course navigation map or an external LMS.

<b>Block of Instruction</b>	A hierarchical grouping of instructional content related by a common instructional theme or set of learning objectives.
<b>Class</b>	A class is a formal grouping of individuals assigned to a learning activity used to track performance and to facilitate the scheduling of resources.
<b>CMI</b>	Computer Managed Instruction. In general, a CMI system manages both student and courseware in a training environment and can have these five components: (1) development of course structures, (2) testing, (3) student rostering which enables the entry of student names and demographic data, (4) student assignment and management, and (5) data collection and management.
<b>Course</b>	A complete unit of instruction comprised of one or more instructional elements, i.e. learning objectives, that constitute the lowest level of instruction for which completion is officially recognized.
<b>Curriculum</b>	A formal grouping of individual courses.
<b>DLC</b>	Distance Learning Center. The DLC is the central node of the MarineNet network. The Marine Corps Institute, as a component of the DLC will provide quality control for distance learning courseware. The primary function of the DLC is to track and maintain the students' training progress and completions. It serves as the interface to the Marine Corps Institute Automated Information System (MCIAIS).
<b>DLRC</b>	Deployed Learning Resource Center. During periods of unit deployment, each ALC will provide the unit with a deployable suite of hardware to access distance learning resources while the unit is deployed.
<b>FLC</b>	Functional Learning Center. Marine Corps formal schools serve as FLCs and manage distance learning courses related to their functional areas of expertise.
<b>LMS</b>	Learning Management System. LMS refers to a suite of functionalities designed to deliver, track, report on, and administer learning content, student progress, and student interactions. The term is used now instead of "CMI" so as to include new functionalities and capabilities that have not been historically associated with CMI systems such as back-end connections to other information systems, complex tracking and reporting, centralized registration, on-line collaboration, and adaptive content delivery.
<b>LRC</b>	Learning Resource Center. A group of personal computers dedicated for Marine training and MarineNet use.

<b>MCI</b>	Marine Corps Institute.
<b>MCIAIS</b>	Marine Corps Institute Automated Information System. The central database repository of Marine Corps on-line distance learning data managed by MCI.
<b>MCTFS</b>	Marine Corps Total Force System. MCTFS is the source data repository for all information maintained on Marine Corps personnel
<b>NIPRNET</b>	Unclassified but Sensitive Internet Protocol Router Network.
<b>Profile</b>	A data entry that defines an individual. A profile can be created and maintained for each eligible user of the system and consists of demographic information, roles, and content specific associations.
<b>Role</b>	An explicit definition of a user's capabilities within the business rules established by program oversight. User roles allow specified privileges and capabilities in consideration of responsibilities.
<b>TEPOP</b>	Training and Education Point-of-Presence. The TEPOP server controls the installation, administration and management of all digital instructional material.

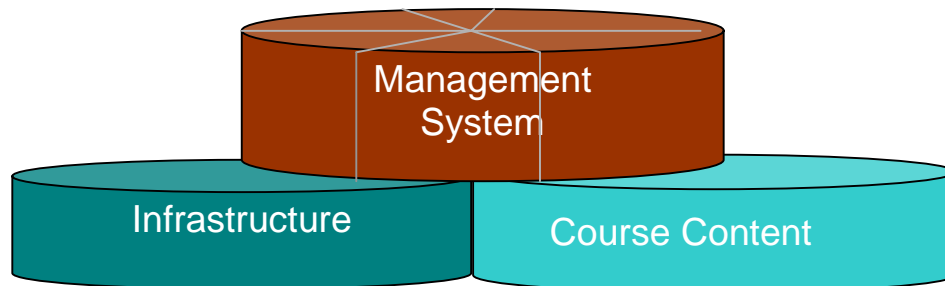
## **1.5 Requirement Wording Convention**

System requirements for the LMS are identified in this document with “shall” in the requirement statement. Statements expounding requirements that include the terms “may” or “should” for the LMS are expressions of intent or desire. Expressions of “may”, “will”, or “should” that describe users of the system or other external systems that interface with the LMS encompass expectations or assumptions for those elements.



## 2.0 SYSTEM OVERVIEW

MarineNet is a major component of the Marine Corps Distance Learning Program. It is a Marine Corps-wide, distributed network that will enable Marines to learn via the appropriate interactive media, when and where the learning is needed. Major functional elements of MarineNet include the communications infrastructure, instructional content and management system software as depicted in Figure 1. Elements that comprise the management system are addressed later in this document.



**Figure 1. Functional Elements of MarineNet**

The LMS will be a web-based application built on a distributed database architecture providing the management system for MarineNet. The LMS will reside at each of the three basic levels of the MarineNet architecture, described briefly in subsequent paragraphs, providing core functionality and unique capabilities at each level. The system will provide on-line and off-line functionality and must be capable of supporting the planned Deployed Learning Resource Centers (DLRC), which provide learning resources to units deployed away from their parent bases or stations.

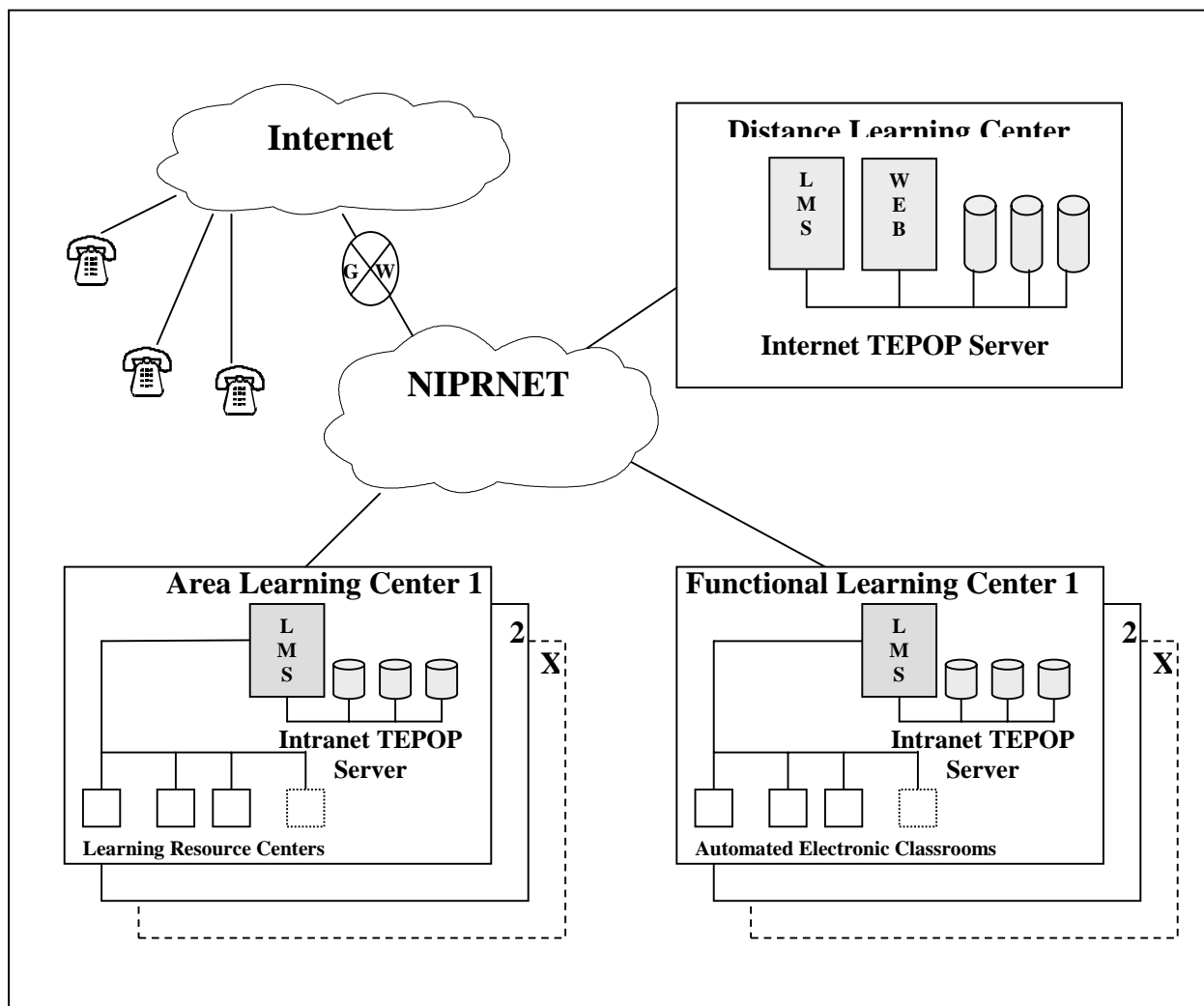
### 2.1 MarineNet Architecture

There are three basic centers, or levels, associated with distance learning within MarineNet. Each of the centers translates to an echelon within the Marine Corps with assigned roles and responsibilities appropriate to that level. The functional centers associated with Marine Corps Distance Learning and the echelons that they represent are:

- Distance Learning Center (DLC) – Marine Corps level; Single node with Marine Corps Institute (MCI) as a component of the DLC
- Functional Learning Center (FLC) – Formal school level
- Area Learning Center (ALC) – Base and Station base level

Figure 2 diagrams the three basic learning centers within MarineNet. The Distance Learning Center is the central node supporting multiple Functional Learning Centers located at various formal schools and multiple ALCs located at Marine Corps Bases and

Stations. The formal schools will support multiple Automated Electronic Classrooms, and the Area Learning Centers will support one or more Learning Resource Centers (LRC).

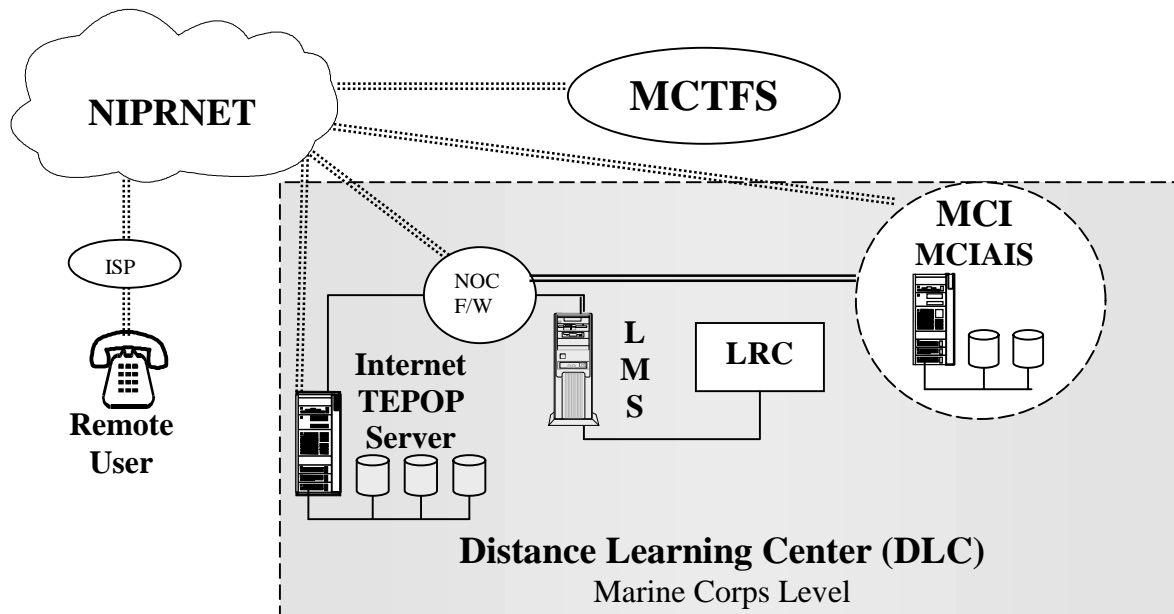


**Figure 2. MarineNet Learning Centers**

### **2.1.1 Distance Learning Center (DLC)**

The Marine Corps Institute, as a component of the DLC, will provide Corps-wide standardization, certification, and quality control for Distance Learning Courseware. Its primary function is to track and maintain the student's training progress and course completions. The DLC must interface with MCIAIS and will manage the master distance learning data ensuring complete and accurate information is ultimately passed to the Marine Corps Total Force System (MCTFS). The DLC will provide a consolidated Corps-wide on-line catalog of distance learning offerings to include a video teletraining (VTT)

broadcast listing. The DLC will also have a networked LRC to support its local Marine population. A graphical representation of the DLC node is provided in Figure 3.

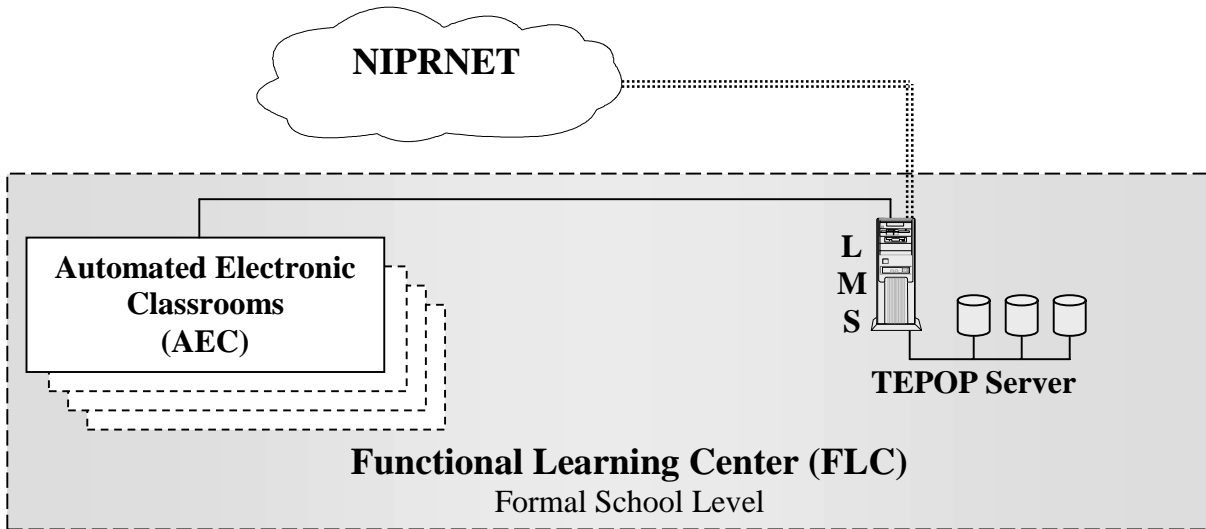


**Figure 3. Distance Learning Center**

### 2.1.2 Functional Learning Center (FLC)

Formal Marine Corps schools will serve as FLCs and manage electronic Distance Learning Courses related to their functional areas of expertise. FLCs represent the school-level within the distance learning structure. FLCs have the processing resources to support interactive courseware preparation and have VTT capable classroom assets to support live two-way interactive, remote video classes.

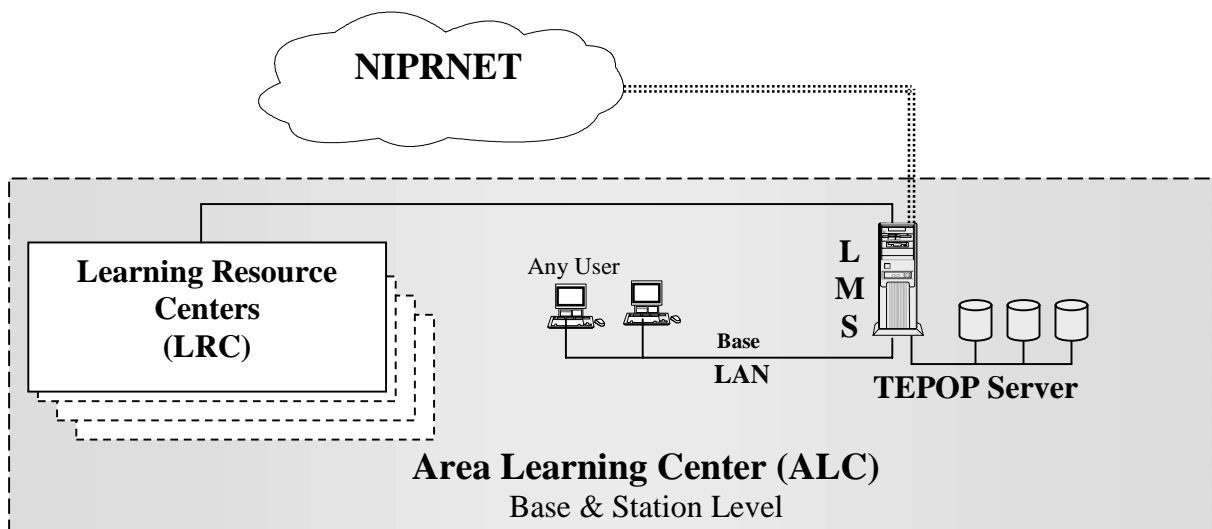
Figure 4 shows the Automated Electronic Classroom (AEC), the Training and Education Point of Presence (TEPOP) servers, and the LMS nodes within the FLC. Additionally, the FLCs will play a key role in monitoring student progress and ensuring distance learning quality control. FLCs may develop Distance Learning Courseware.



**Figure 4. Functional Learning Center**

### 2.1.3 Area Learning Center (ALC)

ALCs are geographically diverse sites designed to be the primary delivery point for Distance Learning Courseware to the operational Marine Corps population. ALCs will consist of a TEPOP server suite and multiple LRCs. See Figure 5. The LRC is a networked computer facility that provides individual Marines with access to the TEPOP and the stored distance learning products. ALCs will also have VTT Centers, which will provide the capability to conduct distance learning using the latest Video Teleconferencing (VTC) technologies. Reference 6 provides specific details for a notional LRC configuration.



**Figure 5. Area Learning Center**

**2.1.3.1 Deployable Learning Resource Center (DLRC).** During periods of unit deployment, units will access distance learning resources using the DLRC. This small self-contained, ruggedized client-server network will emulate the capability of the fixed site LRC. Further, it will have the capability to connect to shipboard or external Transmission Control Protocol/Internet Protocol (TCP/IP) networks. The DLRC system is composed of a server and twenty client workstations. Courseware will be uploaded to the deployable server before the unit deployment. Student tracking information will be updated through a "reach back" capability to the host unit TEPOP where adequate long haul communications links exist. Reference 8 provides specific details for a notional DLRC suite and operational concept.

**2.1.3.2 Training and Education Point of Presence.** The TEPOP controls the installation, administration and management of all digital instructional material. TEPOPs also provide for storage and distribution of training material via the base telecommunications infrastructure. The TEPOP servers will normally be co-located with local Network Operations Center servers. Reference 9 provides hardware requirements and a notional configuration of a TEPOP suite.

## **2.2 Background**

The evolving MarineNet system is an enterprise system consisting of hardware and software components connected by wide-area and local-area connectivity. Base Local Area Networks (LAN) provide the local connectivity between LRC users and TEPOP servers; Wide Area Network (WAN) connectivity is provided over the NIPRNET connecting the various levels of the MarineNet architecture with the DLC. Remote users have access to the LMS at the DLC via the Internet through a gateway to the NIPRNET. Additional details on the MarineNet system are provided in reference 1.

The DLC provides the interface to the Marine Corps Institute's Automated Information System (MCIAIS) and MCTFS. MCTFS is the source data repository for all information maintained on Marine Corps personnel.

The current management software for distance learning is the "Thin CMI" or MarineNet Block I software. It was developed to provide essential capabilities of proctoring courseware enrollments and delivering courseware to students. An upgrade is in development, MarineNet Block II, which will incorporate expanded requirements and will provide an improved, easier to use interface. The upgrade extends the usefulness of the system until a COTS LMS product is selected and fielded.

During initial efforts to determine and articulate desired functionality for the LMS, the DLC, formerly the Distance Learning Branch, published a Notice to Industry (see reference 2) and solicited candidate COTS products for consideration. Phase I testing was accomplished by Naval Postgraduate School (NPS) on the more promising candidates in a single point-of-presence environment. A summary of results is provided in reference 3; detailed results are provided in reference 4. Experience gained in earlier efforts has been

used to further refine test criteria and refine desired system functionality. Future testing will be comprehensive, evaluating each candidate system in a distributed environment for functional effectiveness in the areas described in this document.

### **2.3 Objective**

The selected LMS will replace the current Block I and pending Block II upgrades for MarineNet, which fill the interim need for an interface with MCI via MCIAIS for user authentication, student registration, courseware delivery, on-line testing, instructional management and system reporting.

The LMS will provide management services to each level of the MarineNet hierarchy depending on the general and unique requirements at each level. Students from any networked workstation or LRC workstation will access the LMS. Additionally, remote users will access the LMS through the Internet via the Internet TEPOP.

At the FLCs, the LMS will allow instructors to track courseware during the development and certification process in addition to the core usage for students and LRC administrators. Personnel at the FLCs will use the LMS to create and schedule classes and assign appropriate resources to those classes.

At the DLC, the LMS will provide for overall system management and analysis, catalog preparation, courseware consistency, distribution and availability. The LMS at the DLC will provide an interface with MCIAIS.

At the ALC, the LMS will enable students to access distance learning courseware and participate in classes as required. The LMS will monitor student usage, course progress, and provide student evaluation and completion information back to the appropriate FLC and to the DLC.

For the DLRC, the LMS will operate in a stand-alone configuration providing an autonomous capability for deployed units. The LMS with a DLRC may have a reach-back capability to the DLC when a communication channel is available.

### **2.4 Existing Methods and Procedures**

System design procedures, notional configurations of various nodes, and detailed processes are provided in References 6 and 7.

### **2.5 MarineNet Operational Concept**

MarineNet components are fielded to numerous locations worldwide. Fielding plans are being closely coordinated with the Base Telecommunications Infrastructure (BTI) upgrade sequence established by Marine Corps Systems Command to ensure the communications infrastructure is established to support the Distance Learning Program in the LAN and MAN networks. The BTI architecture was designed to upgrade the existing base

telecommunication backbone to support all base-wide connectivity. The backbone will consist of a high speed, 155 – 622 Megabits per second (Mbps), fiber optic network constructed in a ring and/or star configuration.

MarineNet also will require worldwide connectivity, and employment will rely upon NIPRNET. The bandwidth available to support distance learning at individual Marine Corps bases varies widely from a low of 256 kilobits per second (Kbps) to OC-3 capacity. The bandwidth available from deployed and shipboard locations is generally a low bandwidth connection between 50 and 64 Kbps.

Courseware will be distributed from the DLC/FLCs to the various ALC TEPOP servers for local storage and access. Marines will register for distance learning courses through on-line registration procedures that will be controlled and verified electronically by the LMS. If a course is available locally, Marines can access the material immediately. Otherwise, course materials will be forwarded to the respective ALC by the sponsoring FLC or mailed directly to the Marine by the DLC. Course progress will be tracked locally by TEPOP administrators through the LMS. Course completion data will be reported automatically to the respective FLC for analysis and to the DLC for entry into MCTFS. VTT course registration will be accomplished in the same manner as interactive courseware. Eventually, a VTT facilitator at the ALC VTT Center will monitor each VTT course. VTT course completion data will be entered by the ALC administrator and reported to the DLC for entry into Marine Corps Total Force System (MCTFS). All distance learning end-of-course tests will be proctored by LRC administrative personnel to maintain integrity of the testing process.

### **2.5.1 Summary of Improvements**

The COTS LMS solution will improve the responsiveness, availability and consistency of courseware delivery to the students. The system allows automated and mass registration of students by administrators at various levels and the scheduling of necessary resources for established courses.

The LMS will allow transient students to use the system by maintaining student profiles with active bookmarks and allowing access to those bookmarks from home sites.

The LMS will expand and automate system reporting, improve student progress tracking, and facilitate tracking of courseware in development.

The LMS will expand the availability of courseware to students outside the LRC to individual workstations on the Base LAN, users at “dial-in” sites, and users in deployed units.

The LMS will replace the current prototype MARTest on-line testing application and provide support for testing at remote sites when a network connection to the DLC is not available.

### **2.5.2 Summary of Impacts**

No elimination of responsibilities is envisioned for system administrators, course developers, or training managers. System employment will stress minimized training requirements for local administrators and students to use the system. The impacts of fielding the new system are reflected in paragraph 2.5.1 above.

### **2.5.3 Assumptions and Constraints**

The following are assumptions or constraints for the LMS:

- The LMS shall support on-line operations.
- The LMS shall support off-line operations by providing locally stored courseware to students, storing and forwarding administrator, student activity and tracking information to the DLC when connectivity is reestablished.
- The COTS vendor must be on the GSA schedule. This constraint facilitates the procurement process to meet program milestones.
- The COTS product must be customizable, and it should conform to AICC web-based guidelines (AGR 010). The vendor should articulate its intention to migrate to the SCORM guidelines.
- The LMS will operate on a multi-tiered architecture, multi-tiered meaning browser-based clients, middleware applications, and separate database architecture. The LMS will use the MarineNet communications infrastructure that provides WAN and LAN connections between training centers and administrative nodes. The WAN connectivity uses the NIPRNET; all base activities and organizations compete equally for the limited bandwidth available.



### 3.0 SYSTEM REQUIREMENTS

The general requirements for the LMS can be grouped into the following functional areas:

- **Student Administration** which includes development of student profiles, class and course registration and user access.
- **Scheduling** which provides for the alignment of appropriate resources to conduct training.
- **Launch and Control** of courseware, remediation and bookmarks.
- **Performance Testing** including pre-tests, in-line testing during training, and post test delivery.
- **Reports** for grades and training completion, resource usage and student attendance.
- **Database Administration** of all system records.
- **Cataloging** of authorized courseware and tailored presentation in consideration of varying privileges according to user roles.
- **Data Analysis** to provide requested information to system administrators.

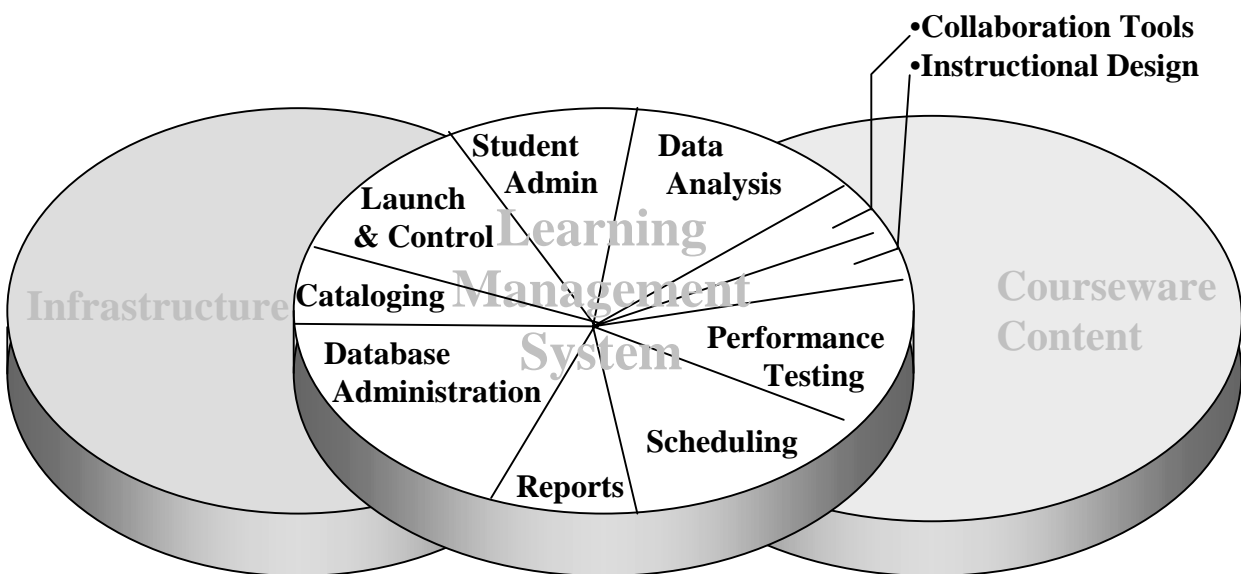


Figure 6. LMS Functional Areas

Figure 6 also includes collaboration tools and instructional design tools that are considered desirable features, but their level of priority is not considered critical; therefore they are not included in this FRD.

### **3.1 General Requirements**

#### **3.1.1 Usability**

The LMS shall be easy to operate to minimize training requirements for students and administrators at the DLRC and ALC levels. The LMS system shall provide on-line help for all system functions to all users. The help system shall be modifiable/customizable for the appropriate system configuration, whether at the ALC, FLC, DLC, or DLRC.

#### **3.1.2 Scalability**

The LMS shall be scalable to allow for expanding and variable topologies. The MarineNet topology includes a variable community of ALCs and FLCs. Each ALC and FLC may consist of one or more LRC or AECs, respectively, depending on the location, size and dispersion of the using community.

**3.1.2.1 Number of Registered Users.** There shall be no restriction on the number of registered users of the LMS. Registered users are those valid users that are recognized by the LMS. For planning purposes, the maximum number of registered users on the system is 10 million.

**3.1.2.2 Number of Active Student Registrations.** The LMS shall support a minimum of 250,000 student registrations that is student-to-course assignments.

**3.1.2.3 Number of Active Courses.** The LMS shall support a minimum of 10,000 active listings in the course catalog.

**3.1.2.4 Number of Active Students Accessing Lessons Concurrently.** An active student is one currently conducting an on-line session via the LMS. The LMS shall support a minimum of 2,500 active students concurrently.

**3.1.2.5 Scalable Server Architecture.** The LMS shall be capable of scaling up to support additional supported sites and an increase in the number of users. Performance levels, as perceived by the user in terms of system response times and courseware availability, must remain consistent after expansion.

#### **3.1.3 Synchronization**

**3.1.3.1 Automated Synchronization of Student Performance Data.** The LMS shall continue to record student data even when the ALC is not connected to other sites. The LMS shall synchronize student data with other sites, such as the DLC, when organizations

are disconnected and resume synchronization once a connection is re-established without loss of data.

**3.1.3.2 Automated Synchronization of Student Self-registration.** A student may register for a course that he or she is authorized to take even when the ALC is not connected to the DLC or other sites that normally maintain this data. The LMS shall synchronize student registration data with these sites when connectivity is reestablished.

Validity checks for authorized system users should be conducted on the local level that would allow for registration at the ALC when connectivity has been lost with the DLC. If the user has not been registered before or does not have a profile recorded at the local ALC, self-registration will be affected.

### **3.1.4 System and Database Connectivity**

The LMS shall interface with the TEPOP database and other system applications using industry standards. These standards will include Open Database Connectivity (ODBC) and Structured Query Language (SQL). Proprietary interfaces must not be used.

### **3.1.5 Standards**

The Department of Defense (DOD) established the Advanced Distributed Learning (ADL) initiative to develop a DOD-wide strategy for using learning and information technologies to modernize education and training. The ADL initiative has defined high level requirements for learning content and attempts to define a reference model in the ADL SCORM (see Reference 11) that meets the ADL high level requirements.

The SCORM's purpose is to apply current technology developments – from groups such as the Instructional Management System (IMS) project, the AICC, and the Institute of Electrical and Electronic Engineers (IEEE) Learning Technology Standards Committee – to a specific content model and to produce recommendations for consistent implementations by the vendor community. The SCORM guidelines and emerging IEEE specifications are relatively immature; therefore, the Marine Corps Distance Learning LMS will adhere to more mature AICC standards in this document. Relevant standards for the LMS system are included in the following subparagraphs.

**3.1.5.1 LMS (AICC) Web-based.** The LMS system shall comply with the base AICC standards. See references 5a and 5b. These standards define the communications and data formats that are exchanged between the courseware and the student training performance database. At a minimum, the LMS shall comply with the web-based standard for Hyper Text Transport Protocol (HTTP) communications as defined in AICC AGR 010.

**3.1.5.2 LMS (AICC) API-based.** LMS compliance with the emerging API standard is desired. See Appendix B of reference 5a. The IEEE is updating and formalizing the AICC standard as the IEEE P1484 standard. The IEEE does not presently provide a test program or a test procedure for verification of API-based communication.

**3.1.5.3 Learning Object Model (IMS) Meta-data.** The IMS is developing a specification to facilitate finding, retrieving, running and tracking the use of content from multiple CBT developers and across disparate computing environments. The draft IMS specifications define a set of common labeling conventions for LMS data. The LMS solution should accommodate future enhancements and upgrades with regards to IMS specifications.

### **3.1.6 General System Administration Functions**

There are general requirements for system users at all echelons other than students to create, modify, and delete data objects identified by the LMS. The data objects are described in the following paragraphs.

**3.1.6.1 Creation, Change, and Deletion of Profiles.** A profile is data entry that defines an individual. A profile can be created and maintained for each eligible user of the system and will include demographic data, roles, assigned courses, eligibility criteria, etc. There shall be no practical limit for the number of profiles that can be created. The LMS shall provide the capability for system administrators at each level of the MarineNet hierarchy to create, change, or delete a profile on a student user.

**3.1.6.2 Creation, Change, and Deletion of Roles.** A role is an explicit definition of a user's capabilities within the business rules established by program oversight. User roles allow specified privileges and capabilities in consideration of responsibilities. Roles shall include, but are not limited to:

- Student
- Instructor
- System Administrator
- Training Manager
- Proctor
- Training Developer
- Guest

The LMS shall allow the creation of multiple user roles. Roles are described further in paragraph 3.5.1.3.

**3.1.6.3 Creation, Change, and Deletion of Classes.** A class is a formal grouping of individuals assigned to a learning activity used to track performance and to facilitate the scheduling of resources. Classes are usually formed to provide a means of cooperative/collaborative learning among a group of students and may be led or facilitated by an instructor. Classes may be assigned facilities and equipment such as VTT equipment and a VTT classroom. The LMS shall provide a capability for administrators to create, change, and delete classes.

**3.1.6.4 Creation, Change, and Deletion of Groups.** A user group is an informal grouping of individuals based on a key attribute, i.e. rank, Military Occupational Specialty, billet assignment. The user group will aid in mass registrations and in determining adherence to some course prerequisites. The LMS shall provide a capability for administrators to create, change, and delete groups.

**3.1.6.5 Creation, Change, and Deletion of Courses.** A course is a complete unit of instruction comprised of one or more instructional elements, e.g. learning objectives, that constitutes the lowest level of instruction for which completion is officially recognized. The LMS shall provide a capability to create, change, and delete a course.

**3.1.6.6 Creation, Change, and Deletion of Curriculum.** A curriculum is a formal grouping of individual courses. The LMS shall provide the capability for administrators to create, change, or delete a curriculum allowing administrators at the FLC and DLC levels to structure training syllabuses to meet changing requirements.

**3.1.6.7 Creation, Change, and Deletion of Resources.** Resources are available material and personnel assets, usually finite in quantity, used to conduct or support training, e.g. classroom, instructor, VTT unit. The LMS shall provide the capability for system administrators to reflect changes as resources are added or lost.

## **3.2 Specific Functional Requirement**

### **3.2.1 Student Administration**

#### **3.2.1.1 Student Profiles**

**3.2.1.1.1 Manual Student Profile Entry.** The LMS shall provide administrators at all levels with the capability to manually create new student profile data and to manually modify or delete existing student profile data.

**3.2.1.1.2 Automated Profile Entry/Transfer.** The LMS shall provide the capability for administrators at all levels to create, modify or delete new student profile data using automated processes. The LMS shall be able to access profile data from another system and other parts of the same system through automated means.

A list of students for groups or classes generated in another system should be able to initiate an automated profile function.

#### **3.2.1.2 Class and Course Registration**

**3.2.1.2.1 Mass Registration From Existing Electronic Data.** The LMS shall provide the capability to individuals in specific, predefined roles down to the ALC level, the ability to conduct mass registration for students, identified individually or by user group(s), extracted and coalesced from available electronic records.

**3.2.1.2.2 Student Self-Registration.** The LMS shall provide the capability for a qualified student to self-register for a course or a collection of courses.

**3.2.1.2.3 Instructor Registration of a Student.** The LMS shall provide the capability for an instructor to register and de-register a student.

**3.2.1.2.4 Administrator Registration of a Student.** The LMS shall provide the capability to administrators at all levels to register students, edit student registration data, and de-register a student. The administrator must also be able to respond to students and instructors who are having difficulties with the registration process, such as self-registration. The LMS shall provide the capability of a specific, predefined administrator to override registration requirements. See subparagraph 3.5.1.4.

**3.2.1.2.5 Register for Multiple Courses.** The LMS shall allow instructors and administrators at all levels the ability to register students for additional courses. Since a student may be required to take more than one course at a time, the LMS shall allow a student to self-register for multiple courses.

**3.2.1.2.6 Register a Formed Class.** Students may register and take lessons independently but may also be assigned to a class. Classes are usually formed to provide a means of cooperative/collaborative learning among a group of students and may be led or facilitated by an instructor. Classes may be assigned facilities and equipment such as VTT equipment and a VTT classroom. The LMS shall allow administrators and instructors at the FLC the capability to register all students in a scheduled class.

**3.2.1.2.7 Register From Multiple Locations.** Marine Corps students may be assigned to various locations throughout the world at short notice. The LMS shall allow a student to self-register for a course from any location that has access to an ALC or DLRC.

**3.2.1.2.8 Student De-registration.** The LMS shall provide the capability for specific, predefined roles to de-register a student at any time. The LMS shall allow an instructor to de-register a student from a course or class to which the instructor is assigned. The LMS shall allow a student to de-register for any optional course to which he or she self-registered.

**3.2.1.2.9 Progress Tracking.** The LMS shall track the progress of a student in all courses for which the student is registered to include registration, course completion, and de-registration.

### **3.2.1.3 User Access**

**3.2.1.3.1 User Authentication.** Authentication identifies a user attempting to access the system. The MarineNet must have the capability to identify a user before providing access to its services and data. If MarineNet does not provide sufficient security services, then the LMS shall authenticate users before providing LMS services and data. If authentication

and access rights are controlled outside the LMS system, the LMS system shall be able to operate in concert with the security rights and privileges of MarineNet.

**3.2.1.3.2 Specify User Privileges.** The LMS shall provide the capability for specific, defined roles to define user privileges and then enforce those privileges.

**3.2.1.3.3 Assign Roles.** The LMS shall provide the capability for specific, defined roles to assign specific roles to specific user(s) or group(s). Users will have different system responsibilities based on such factors as role, user location, user rank, user billet or skill level.

**3.2.1.3.4 Assignment of Multiple User Roles.** Administrators, instructors and courseware developers may also be students. There may also be cases when an Instructor must also perform administrative functions. The LMS shall allow an authorized administrator to assign any user role to any user and may assign multiple roles to a single user within the limits of the administrator's authorization. The user should be able to log-on multiple times as a different user role.

## **3.2.2 Scheduling**

The focal point of scheduling classes and assignment of corresponding resources is deemed to be at the FLC.

**3.2.2.1 Schedule Class.** The LMS shall have the capability for an instructor to schedule classes and modify existing schedules.

**3.2.2.2 Assign Student.** The LMS shall provide the capability to schedule students for both on-line and off-line activities. On-line students normally access lessons asynchronously. However, there may be times when on-line students prefer to coordinate or cooperate with other users for a project. On-line students may also participate in scheduled events hosted by an instructor.

**3.2.2.3 Assign Instructor.** Classes, VTTs and virtual groups may require the participation of one or more instructors at predictable times. The LMS shall have the capability to assign an instructor to a class, VTT, and virtual group.

**3.2.2.4 Align Course(s).** The LMS shall have the ability to select a course(s) and align it with a formed class. This course alignment identifies the course(s) content for a given class.

**3.2.2.5 Assign Resources.** The LMS shall provide the capability to schedule resources such as VTT equipment and rooms. The scheduling capability should be expandable to allow the addition of other types of resources and to increase or decrease the number of specific resources such as VTT rooms.

**3.2.2.6 Schedule Conflict Identification.** The LMS shall identify and notify appropriate level administrators or instructors of scheduling conflicts.

**3.2.2.7 Schedule Modification.** The LMS shall provide the capability to an administrator or instructor to modify a schedule.

### **3.2.3 Launch and Control**

**3.2.3.1 Course Status.** The LMS shall have the capability to manage the status of a course throughout its lifecycle.

**3.2.3.2 Course/Lesson Presentation.** The LMS controls what lessons are displayed to the student. Therefore, the LMS system shall be able to launch a web-based lesson such that the lesson is presented at the student's workstation.

**3.2.3.3 Presentation Based on Pre/Post Test.** The LMS program or system shall be able to present lessons based on the results of pre- or post-tests (student performance assessments). The results of a pretest may permit a student to skip material that he or she already knows. A post-test is designed to determine a student's mastery level. The LMS shall be able to control lesson presentation based on the results of post-tests.

**3.2.3.4 Delivery Available Through a Browser.** All LMS services shall be accessible from a web browser; browser independence is desired. The current standard browser at the LRCs is Microsoft Internet Explorer version 5.5.

**3.2.3.5 Automated Remediation.** Student monitoring or post-test results may reveal knowledge or skill gap. The LMS shall be able to provide remediation based on a student's performance measure. The LMS program or system shall present an automated remediation solution for a specific student if provided by the courseware.

**3.2.3.6 Manual Remediation.** Student monitoring or post-test results may reveal knowledge or skill gap. The LMS shall be able to provide remediation based on a student's performance measure. The LMS program or system shall provide the capability for an instructor to determine a remediation solution for a specific student.

**3.2.3.7 Time in Lesson or Assignable Unit (AU).** The LMS shall be capable of recording the time a student spends in a lesson or AU. The information will be available for solicited reports or for grouping with other data for routine reporting.

**3.2.3.8 Bookmarking.** The LMS shall be able to record where a student has left off in a lesson or course. Student bookmarks shall be available to a student if the student logs on from a different site if connectivity exists between the original (home) and transient site.

**3.2.3.9 User Communication/Synchronous.** The LMS shall provide the capability for on-line students assigned an instructor to communicate with the instructor. If the student is a member of a class, the student must be able to communicate with the instructor in real



time such as chat. More than two students must be able to collaborate together. No specific limit will be set on the number of students who may collaborate. Student collaboration must be controlled by the LMS or through integration of third party tools.

**3.2.3.10 User Communication/Asynchronous.** The LMS shall support student-to-student collaboration capabilities. If the student is not part of a class, the student must be able to communicate with an assigned instructor asynchronously such as e-mail.

#### **3.2.4 Performance Tests**

**3.2.4.1 Pre-test Delivery.** The LMS shall be able to launch pre-tests prior to the student taking a lesson if provided by the courseware. The LMS shall have the capability to capture the pre-test results data if provided by the courseware.

**3.2.4.2 Post-test Delivery.** The LMS shall be able to launch post-tests after the student has taken a lesson. Post-tests evaluate the student's progress in the lesson but is not the test for record. The LMS shall have the capability to capture the post-test results data if provided by the courseware.

**3.2.4.3 In-line Test.** An in-line test is a test given inside a lesson or AU. The LMS shall be able to support in-line tests and capture results if provided by the courseware. The LMS shall have the capability to capture this data if provided by the courseware.

**3.2.4.4 End-of-Course (EOC) Test.** The LMS shall support on-line testing of students. The end-of-course test is developed by the training developers and managed from the master LMS repository at the DLC and constitutes the exam for record. EOC tests are made available at each ALC LMS. The LMS maintains a record on the number of attempts for EOC tests and enforces established business rules for the number and frequency of attempts. Test results are recorded and forwarded to the MCIAIS via the DLC LMS.

**3.2.4.5 Off-line Testing Result Entry.** The LMS shall support the entry of off-line test results by the instructor.

**3.2.4.6 Randomization of Test Items.** The LMS shall support the presentation of randomized test items.

**3.2.4.7 Multiple Question Types.** The LMS shall be capable of presenting multiple question types for testing purposes.

#### **3.2.5 Cataloging**

The LMS shall be capable of providing up-to-date course status information for the courses valid users are authorized to view and access. Registered courses may be enabled, disabled, temporarily unavailable, discontinued or planned.

**3.2.5.1 Generate Catalog.** The LMS shall generate and maintain a course catalog of all registered authorized courses. The LMS shall include course characteristics, such as course length, format, and availability status, and any course prerequisites in the catalog description. The LMS shall provide the course catalog to all authorized users. Catalog generation should support presentation by groupings of courses.

**3.2.5.2 Course Catalog Review.** The authorized view of the course catalog contents may differ for each user according to the user's active role and privileges. Students will view only available, authorized courses while administrators may also view a discontinued course. Instructors may view and access courses under development. The LMS shall deliver course catalog views in consideration of user privileges.

### **3.2.6 Reports**

The LMS shall be capable of producing reports generated by events, on schedule, or by request from a valid user with appropriate privileges. Event generated reports include registrations, de-registrations, and course completions. Event generated reports should be delivered to pre-determined users by e-mail to inform users and administrators interested in tracking the students' activities. Scheduled reports may be used to monitor system use and are of interest to various levels of system administrators. Reports generated by request are ad hoc reports that may require some data analysis of sorting of the system database. Subjects of ad hoc reports would include student status and activities, tailored requests of resource or system usage different from the scheduled report and course critiques. See subparagraph 3.5.6. The LMS shall have the ability to produce ad hoc reports.

**3.2.6.1 Grades.** The LMS shall provide the capability to create student grade reports for individual students, classes of students and students taking the same course, students assigned to an instructor and students assigned to a group.

**3.2.6.2 Group/Course Grades.** The LMS system shall provide the capability to create student grade reports for individual students, classes of students and students taking the same course, students assigned to an instructor and students assigned to a group.

**3.2.6.3 Course Critique.** The LMS shall support the presentation and processing of instruction critiques.

**3.2.6.4 Resource Usage Data.** The LMS shall be capable of reporting the number of students using a specific server during specified intervals over time. The LMS shall be capable of reporting the use and frequency of all training resources assigned over time. These resources include off-line resources such as classrooms and VTT facilities.

**3.2.6.5 Printable reports.** The LMS shall be capable of formatting reports for printing on standard 8-½ inch by 11-inch paper.

**3.2.6.6 Student Attendance.** The LMS shall be able to report student attendance for scheduled events such as instructor led/moderated classes.

**3.2.6.7 Supports Interoperability with Other Data Analysis Tools.** The LMS shall be capable of integrating additional commercial analysis applications. The LMS shall be capable of exporting data in standard formats. Standard formats include ASCII text, comma delineated format, “.xls”, “.123”, and “.dbf”. Commercial analysis applications include SPSS and SAS products.

### **3.3 Response Times**

System response time is essential to meeting student expectations for courseware delivery and requests for administrative services. The following timing requirements must be considered:

#### **3.3.1 General Timing Requirements**

The LMS shall meet timing requirements on the TEPOP hardware and operating system.

The LMS shall meet timing requirements while supporting the maximum rated number of users.

The LMS shall meet timing requirements for 95% of all operations, that is, no more than 5% of the operations may exceed the stated time limit.

##### **3.3.1.1 Editing Response**

The LMS shall respond to all user inputs that do not require the loading of an HTML page within one second for 95% of all user input or field editing operations.

##### **3.3.1.2 Page View Response**

The LMS shall respond to all user inputs which require the loading of a new HTML page within 10 seconds - the page must be loaded into the browser and viewable - for 95% of all user input or editing operations, with the exception of reports, as defined in Sections 3.2.6 and 3.5.6.

### **3.4 Capacity Limits**

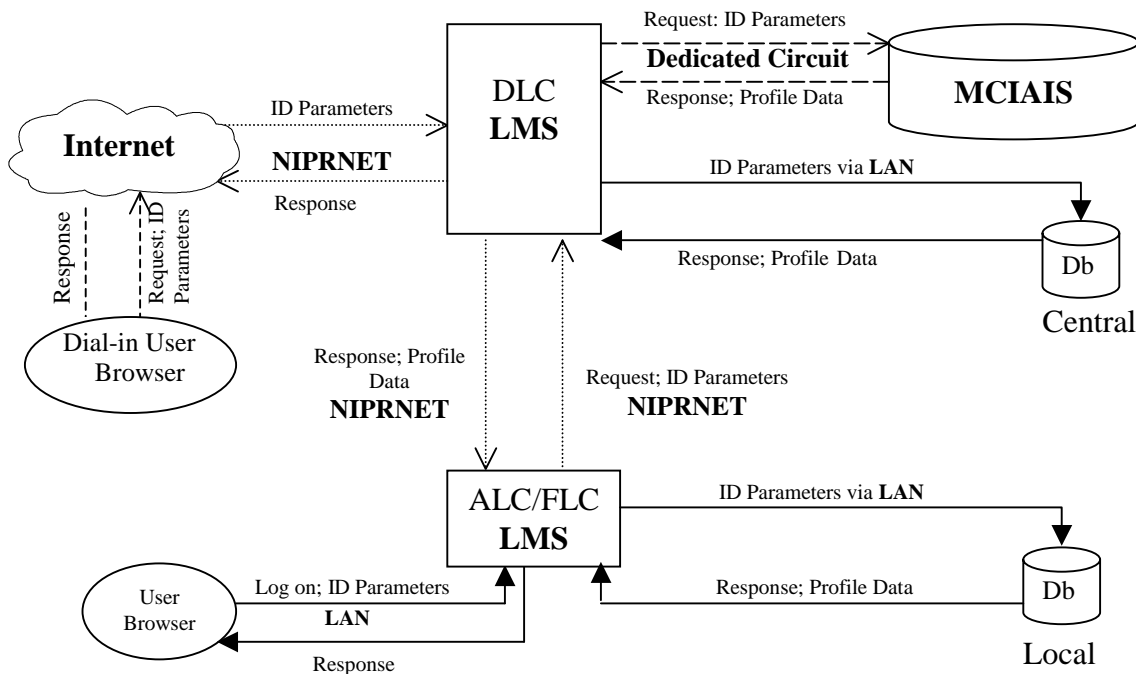
The system capacity is dependent on the capabilities of the Internet TEPOP server suite. Reference 9 provides extensive details on anticipated maximum numbers of transactions, storage requirements, and other quantifiable information about capacity placed on the system. LMS operation shall assume constrained bandwidth conditions. Between CONUS bases and stations, the LMS shall operate with bandwidths ranging between 128 and 256 Kbps for data transfer between LMS systems. For deployed locations, the LMS shall operate with bandwidths ranging between 50 and 64 Kbps for data transfer.

### 3.5 Functional Area System Functions

The following paragraphs provide amplification to the functional requirements provided in section 3.2.

#### 3.5.1 Student Administration

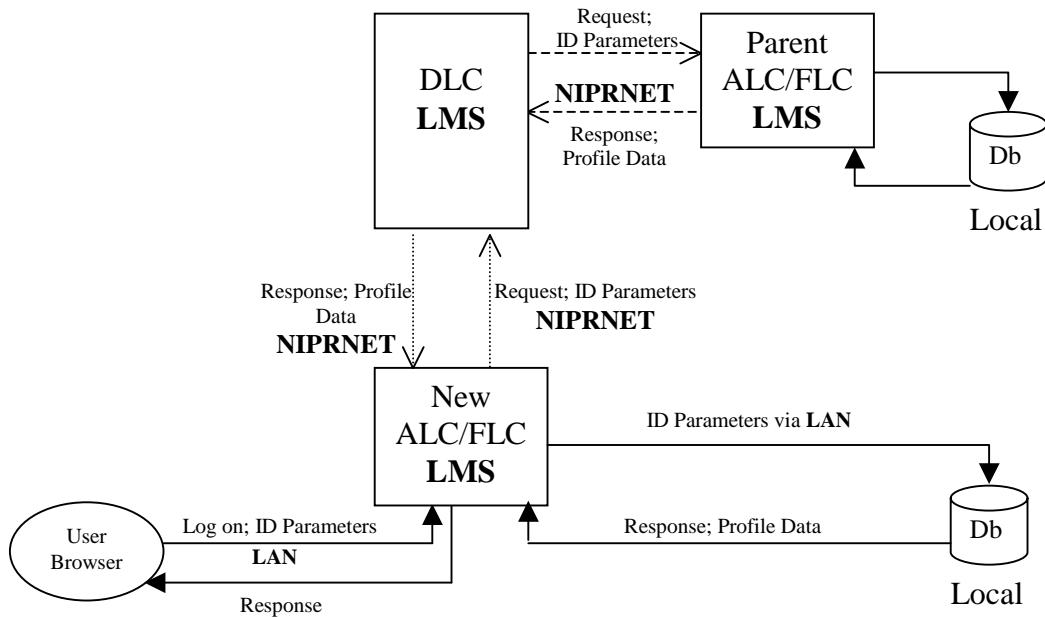
**3.5.1.1 User Access.** The LMS shall provide for the identification and authentication of valid users before providing services. Validity will be determined by comparing the specified user's identifying parameters with those recorded in the local or central database as valid users. Data will be entered by the user's browser which will be compared with files stored locally at the ALC or FLC. Remote users will connect directly to the DLC via their Internet Service Provider (ISP). In the event that there is no existing file at the local level for the user, the request and data will be forwarded via the NIPRNET to the DLC and central database for verification. In the event no records exist at the DLC, the request and data is forwarded to MCIAIS through a dedicated circuit. Figure 7 diagrams the functional connectivity and information flows for user access and user profile delivery.



**Figure 7. User Access and Individual Profile Data Flow**

**3.5.1.2 User Profiles.** Once the user has been authenticated, user profiles are retrieved from the local databases or from the central database at the DLC if authentication was required at that level. Student profiles for users requesting access away from home ALCs will be retrieved from the parent site, connectivity permitting, and forwarded to the new site. Student locations are proxied at the DLC. See Figure 8.

Administrators shall have the capability to manually create and edit a student's profile using the student's identifying parameters. The flow of communications will follow the scheme outlined in Figure 7. Administrators will be able to delete student profiles. In addition to the manual process, administrators will also be able to access profile information from other systems and other elements of MarineNet using automated means. Lists or grouping of students could be used to initiate a sequence of communications to access students' profiles.



**Figure 8. Transient Student Profile Delivery Flow**

**3.5.1.3 Assignment or Roles and Privileges.** Assigned user roles will dictate user privileges. A user may be assigned to multiple roles allowing each user to serve in one or more roles as an administrator, instructor, proctor, etc. A user with multiple roles while logged-in as a student will retain only student privileges. General roles include, but are not limited, to:

- **Student** – User registered to access authorized courseware for training and subsequent testing for credit. Students may view authorized and available courseware in a course catalog.
- **Instructor** – User at a FLC assigned instructor status by a specific, defined administrator (supervisory capacity for course or curriculum). Instructors can assign resources to their assigned courses/classes, to include students; modify class rosters, and request reports/results regarding their course(s). They should have the

capacity to access instructional material in development, which would not be available to the student.

- **System Administrator** – A user with assigned responsibility for general system administration and specific functions determined by his billet. Senior system administrators will have the capability to limit or expand the privileges of subordinate administrators. In addition to creating, modifying and deleting student profiles, a system administrator will be able to register students manually or through automation. He will have the ability to request scheduled or ad hoc reports on the status of the system or individual students. System administrators at the DLC will have privileges appropriate for their interface with the MCIAIS.
- **Training Manager** – A user assigned by a supported unit to manage the unit's training progress. The training manager will have the capability of registering students in his unit, requesting reports on individual students in his unit or collective reports on all students in his unit. The training manager is notified of registrations, de-registrations, test failures, and course completions of students within his unit.
- **Proctor** – A user with the responsibility to validate and monitor students taking end-of-course tests for credit.
- **Training Developer** – A user with the responsibility for developing course content and courseware. The training developer will assign courses to a specified curriculum to meet current training requirements at the FLC and DLC level.
- **Guest** – A user that has not been authenticated. Access to services via the LMS is limited to viewing the listing of authorized courseware in the course catalog.

**3.5.1.4 Class and Course Registration.** Students may be registered for a course, or multiple courses through:

- Self-registration
- Instructor registration
- Administrator Registration

Self-registration will be conducted manually by the student. Once authenticated through the log-in process, students may self-register for a course choosing from listings in a catalog of authorized courseware. The catalog will be stored locally or accessed from the DLC, if necessary. The student may register for multiple courses to the limit established by MCI business rules; the LMS shall enforce the established rules. The LMS shall amend the student data file to record active registration for each course.

While many courses are available for open enrollment, prerequisites are established for some courses that may be based on a single, simple discriminator, such as MOS and rank.

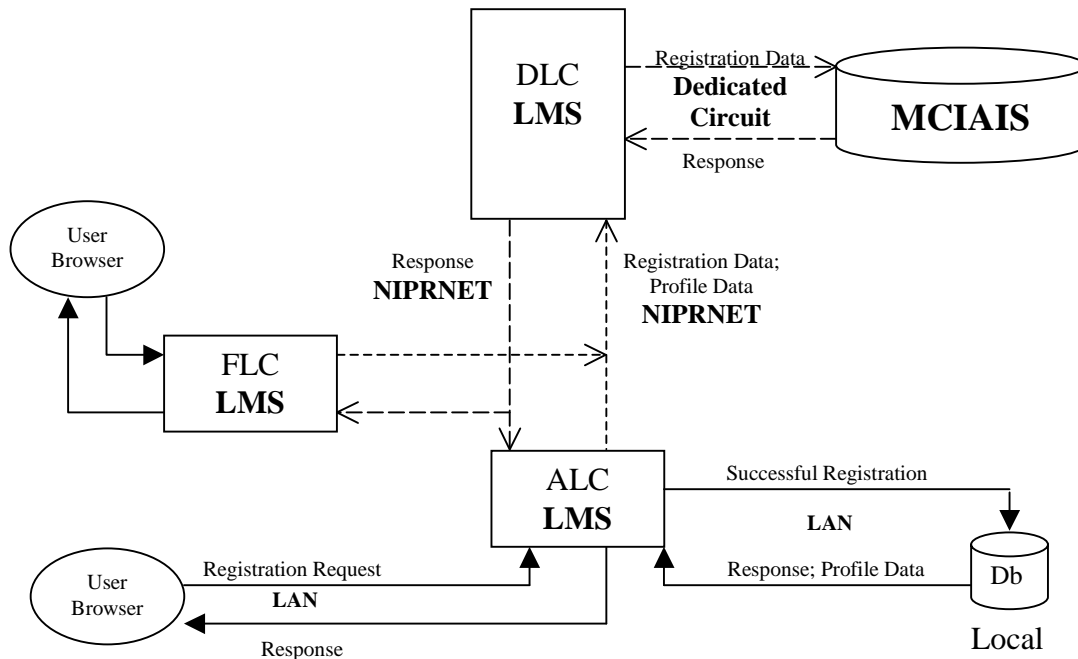
Other prerequisites may be more complex, i.e. based on a selection for promotion to the next grade or a combination of conditions. The course catalog will present to the student a tailored list of available courses to that student. All open enrollment courses would be offered, as well as those courses where general prerequisites are met. Students interested in courses that are not included in their catalogs' views must seek the assistance of a system administrator or unit training manager. With the administrator's view of the catalog, the administrator can process a student's registration request for a course that has been annotated as one having special prerequisites (determined by MCI) or prerequisites that aren't met by examining the student's profile. These registration requests are forwarded to MCI via the DLC LMS for adjudication. Selected administrator(s) at MCI will have the capability of overriding registration criteria for prerequisites and other business rules. Determination of the status of the request will be forwarded to the requestor.

Administrators will have a general capability to register a student for a course, and Instructors will have the ability to register a student manually (individually) for courses to which they are assigned. Unit training managers will have the capability of registering students from their units. Additionally, administrators and instructors will have the ability to use automated means to register multiple students, identified in a data file as a group or informal listing of students, to a course or class. MOS, rank, billet assignments, or other key identifiers can identify student groups for class assignments or individual course registration.

The flow of communications for course registration at the ALC will follow the sequence as outlined in Figure 9 to authenticate each student, access existing profiles, and conduct the desired registrations. Registration requests will be compared with the listing of authorized, available courses for the students and number of courses for which the student is currently registered. Unsuccessful registrations should generate and return appropriate responses to the requestor citing the reason for failure. Successful registrations will be recorded. Figure 9 includes registrations from the FLC. Access to student profiles will necessitate recovery of the affected student profiles from their parents' sites. Registration events are recorded at MCIAIS and are reflected in the locally stored student profiles.

Students may be de-registered from a course by:

- Self for optional, self-registered courses.
- Instructors for courses for which they are assigned management responsibility.
- Administrators within the scope of their privileges.
- Unit training managers for students from their units.
- Other specific, defined roles with the scope of their assigned privileges.



**Figure 9. Class and Course Registrations**

### 3.5.2 Scheduling

Instructors at the FLCs should have the capability of scheduling a class and assigning appropriate resources to conduct that class. Appropriate resources may include instructors, VTT equipment (and required coordination for communications), classroom, and students. The LMS should ensure that scheduled resources do not exceed those available or violate existing restrictions established by standing operating procedures. The LMS shall provide the capability to schedule students for both on-line and off-line activities. Scheduled classes will be published to allow students to view available course offerings if the class is authorized for student self-registration. Students registered for a class by methods other than self-registration will be notified of their status.

### 3.5.3 Launch and Control

The LMS shall be capable of launching web-based courseware, and all services must be accessible from a web browser. The current standard browser at the LRCs is Microsoft Internet Explorer Version 5.5.

Courseware will be stored locally at the TEPOP to the degree possible for timely access by authenticated users. In the event that courseware is not locally available upon registration of a student, the courseware may be delivered electronically by the controlling FLC or DLC to the local ALC/DLRC or mailed in consideration of local bandwidth capabilities and system utilization. Remote users will launch courseware from the Internet TEPOP.



The LMS shall provide the capability for all users to launch and view all courseware that are within the scope of the privileges of the user to access. For students this includes authorized and available courseware for which they are registered. Instructors and training developers will have access to courseware in development. The LMS shall track the status of the courseware through its lifecycle, and not allow access to unauthorized courseware (i.e. courseware in development or decertified courseware.) The LMS shall compare local courseware versions with listings on updated course catalogs to ensure that files stored locally remain valid. The LMS shall not allow unauthenticated users to access courseware.

During the log-in process, the delivered student profile data will include the latest bookmarks recorded during the student's last use of the courseware. If the user logs-in from a transient site, the LMS shall recover the profile information with bookmarks from the home site. The LMS shall be capable of launching the courseware from the latest bookmark at the user's request.

Courseware may include a pre-test to determine the student's understanding of the course material. If the courseware allows, the LMS shall have the capability to launch courseware in consideration of the student's performance on the pre-test, omitting lesson presentations for which the student has already demonstrated mastery. The courseware may include a post-test. The student's performance may indicate specific areas of non-mastery. The LMS shall have the capability to launch courseware based on results of the post-test in accordance with a manually determined remediation sequence outlined by the course instructor. If the remediation plan is a component of the courseware that offers an automated sequence of lesson presentation, the LMS shall launch the automated remediation solution determined by the courseware.

The LMS shall record the progress of the student through the course by noting successful completion or failure of in-line tests and the amount of time spent in each lesson/course.

### **3.5.4 Performance Tests**

**3.5.4.1 Progress Assessment Tests.** Courseware may include the ability to launch a pre-test to assess a student's knowledge of the subject matter of a course or internal lessons within a course. Courses may offer in-line tests to incrementally assess the progress of the student as the student moves through a lesson. Courses may offer post-tests at the end of each course to assess the level of mastery by the student of the course objectives. The LMS shall support the presentation of each type of test capturing the results of each test for use in system analysis and courseware quality.

**3.5.4.2 End-of-Course (EOC) Test.** The test that is given for credit and determines successful completion of the course is the EOC test. Prior to delivery of the test to the student, the LMS shall require authentication of a valid proctor to verify the identity of the student and to supervise the test. The LMS shall have the capability to select and present random questions for the test to allow different versions of the same test, and it shall be capable of presenting questions of different types. Different question types include

multiple choice, true/false, ordering, matching, all-that-apply, fill-in-the-blank, drag-and-drop, and select from a list.

The LMS shall maintain a record on the number of attempts for EOC tests by course and enforce established business rules for the number and/or frequency of attempts by each student. Results of each test will be recorded and available for reports by an individual user or consolidated by group/class for analysis by administrators and instructors. The LMS shall forward notification of test results to MCIAIS via the DLC LMS for record updates and subsequent entry into MCFTS, as appropriate.

The LMS shall support the reporting of results by an instructor of tests conducted off-line.

### **3.5.5 Cataloging**

The LMS shall track courseware through its life cycle from development until it is discontinued and no longer available for access by any user. The LMS shall maintain a course catalog of all registered and authorized courses and a catalog must be available for all users. The LMS will generate a catalog based on the access privileges of the user and prerequisites of the courses (Military Occupational Specialty (MOS) or grade restrictions are examples). The catalog should be capable of grouping courseware based on various parameters such as category type, MOS, VTT, on-line class instruction.

Students and guests will be allowed only to view the course catalog of available courses. Administrators and managers will view available courseware and courseware temporarily unavailable. Instructors and training developers will be have access to courseware under development and discontinued, as well as, the listings provided to the system administrators.

### **3.5.6 Reports**

Reports may be generated by event, scheduled or by request from a valid user with appropriate privileges. Reports generated by events, e.g. registration, de-registration, or course completion, for supervisors' notification and scheduled system level reports should be delivered by e-mail. The LMS must be capable of formatting reports for printing on standard 8 ½ inch by 11 inch paper.

The Unit Verification Report (UVR) will be generated and distributed by MCIAIS as the official report for record purposes.

Tables-1 through 3 include reports generated by event, request, or schedule respectively. Event generated reports will provide spontaneous notification to the users when an event is completed. Training managers will receive information on activities of personnel in their units via e-mail. Completed activities are reported to MCIAIS for record updates.

**Table 1. Event Generated Reports**

Report Type	Provided To				
	Student	Sys Admin	Instructor	Training Manager	MCIAIS
Registration	X	If initiated	If Course lead	X	X
De-registration		If initiated	If Course lead	X	X
Completion			If Course lead	X	X

The LMS shall respond to requests for reports for information provided in Table A-2. The LMS shall be able to respond to ad hoc queries applicable to system and resource usage/scheduling. Types of desired information for resource usage is provided in paragraph 3.5.6.3.

**Table 2. Request Generated Reports**

Report Type	Provided To			
	Student	Sys Admin	Instructor	Training Manager
Student Transcript	X	X		X
Duplicate Diploma	X	X		X
Registration Status	X	X	X	X
Attendance		X	X	
Resource Usage (ad hoc)		X	X	X
Critiques			X (see para 3.5.6.2)	X (see para 3.5.6.2)

Scheduled reports are pre-defined, general system activity reports used by administrators and instructors to monitor and manage system use. The UVR will not be generated by LMS; the official report will be generated and distributed by MCIAIS to the training managers.

**Table 3. Scheduled Reports**

Report Type	Provided To				
	Student	Sys Admin	Instructor	Training Manager	MCIAIS
Resource Usage (pre-defined)		X	X		As Required
Activity Levels		X	X		As required
Class Critiques			X		

**3.5.6.1 Grades.** The LMS shall record grades for EOC tests and shall provide them to users according to Table 4 below. Consolidated results will be available for assigned classes, by course over specified time intervals, by specified instructor assignment, and by specific groups.

**Table 4. EOC Grade Reporting**

Results	Available To				
	Student	Sys Admin	Instructor	Training Manager	Training Developer
By Student	X(e,r)	X(e,r)	X(e,r)	X(e,r)	
By Course		X(r)	X(r)	X(r)	X(r)
By Class		X	X(r)		X(r)
By Group		X(r)	X(r)		X(r)

**Report Generation:** (e) = event; (r) = by request; (s) = scheduled

When the EOC grade meets the requirement for successful completion of a course a course completion report will be generated as discussed in paragraph 3.5.6.

**3.5.6.2 Critiques.** The LMS shall present to the student upon completion of a course a critique questionnaire to evaluate the perceived effectiveness and quality of instruction. The LMS shall provide reports on student critiques consolidated by course for a specified time period, by a specified class, or by a predefined group. Reports will be available to administrators, instructors, training managers and developers.

**3.5.6.3 Resource Usage Data.** The LMS shall record resource usage data to deliver reports on the use of specific resources at the FLC and ALC. Reports will aid in analysis and management of personnel, assignment of instructors, use of LRC and AEC assets and support procurement of additional resources to improve or maintain performance levels.

The LMS shall be capable of reporting information on system infrastructure and operation nodes. Network statistics will be available to system administrators for specific nodes to measure performance and plan for expansion and system improvements.

## **3.6 Inputs and Outputs**

The LMS shall exchange data with the MCIAIS to populate student profile elements and relay student performance information and record course completion events. MCIAIS will forward appropriate information required by MCTFS to update personnel records. Enrollment data, registration data, personnel demographic information and course identifiers will be exchanged with the MCIAIS database. The LMS database shall collaborate with the database schema of MCIAIS and cannot require alteration of that schema. Specific interface requirements and data dictionary elements are detailed in Appendix A. Appendix B contains an Integration Definition for Information Modeling

(IDEF1X) data model that describes the views and underlying table structures identified in Appendix A. The data model provides background information for the development of the views.

The LMS shall accept input from the user's browser and provide appropriate responses to requests to the same. The LMS shall deliver authorized courseware and performance tests to the user, and reports to all users as outlined in paragraph 3.5.6.

### **3.7 Database Characteristics**

The LMS will reside on the TEPOP servers at the ALC and FLC levels and the Internet TEPOP at the DLC level. The TEPOP will use Oracle Enterprise 8.x or Microsoft SQL Server version 7 as the relational database management software. MarineNet will use Oracle Net 8 as the database interface protocol. Specific interface requirements and data dictionary elements are detailed in Appendix A.

### **3.8 Failure Contingencies**

The LMS must provide on-line and off-line capabilities. In the event that connectivity is lost between the ALC or FLC and the DLC, the LMS will still provide autonomous services commensurate with information stored locally. Registration of previously authorized users and access to locally available courseware from the local TEPOP servers will permit continued service. Administrators will retain editing capabilities for stored student profiles. Synchronization of local databases with the central databases at the DLC will be accomplished when connectivity is restored.

In the event of a local LAN failure, no services will be available at the ALC/FLC.

## **4.0 DESIGN CONSIDERATIONS**

### **4.1 System Description**

The LMS shall be functional twenty-four hours a day, seven days a week to serve the dispersed user community. The LMS shall provide convenient, user-friendly interfaces that minimize the need for user and first level administrator training. Additionally, the LMS shall provide automated installation procedures that minimize the requirements for manual input during set-up and initial installation (“wizard”-based procedure). User menu options should reflect the user’s expectation and incorporate appropriate Marine Corps terminology. The LMS shall reside on the TEPOP servers at each echelon of the MarineNet hierarchy and communicate with the MCIAIS from the DLC. The LMS shall provide on-line capability when network connectivity exists. The LMS will support off-line capability at the local level, synchronizing databases with the DLC when connectivity is restored.

The LMS will provide course registration and de-registration services, present tailored courseware catalogs in accordance with user privileges, present requested and authorized courseware to users, provide course tests and record test results, and report those results to MCIAIS.

The LMS shall function in an autonomous role within the DLRC. The DLRC will operate with limited periods of connectivity with the DLC for synchronization and uplink of local activities.

### **4.2 Flexibility/Scalability/Modularity**

The LMS will accommodate multiple independent users simultaneously and be capable of supporting variable operational configurations due to the different user populations at each base or station. The LMS shall easily support expansion as the number of available courses grow and use at the LRCs increase accordingly. The LMS at the ALC shall support one or more LRCs. The LMS at the FLC shall support one or more AECs. The LMS at the DLC shall accommodate expansion of the number of ALCs and FLCs without degradation of service as perceived by the user.

## **5.0 ENVIRONMENT**

### **5.1 Equipment Environment**

The LMS will be located on or with the TEPOP servers at each level of the MarineNet hierarchy operating in a standard office environment. The LMS for the DLRC will operate in a shipboard environment in climate controlled conditions.

### **5.2 Support Software Environment**

The LMS system shall use the Microsoft NT 4.0 or Microsoft Windows 2000 as the operating system for workstations and servers.

### **5.3 Communications Requirements**

The LMS will depend on the Marine Corps bases' communication network infrastructure for LAN connectivity between the LRCs and local TEPOP servers. Connectivity between ALC, FLC and DLC will be via the NIPRNET. Connectivity between the DLC and MCIAIS will be over a dedicated OC3 ATM circuit. Remote users will have access to the Internet TEPOP via the World Wide Web through a gateway to the NIPRNET.

### **5.4 Hardware**

The LMS depends on the Marine Corps communications network and workstation LAN adapters for connectivity between system components. There are no additional hardware requirements.

### **5.5 Software**

The LMS user browser shall be vendor and version independent to support communications over standard TCP ports supported by the Marine Corps network infrastructure. The LMS shall support the use of third-party communication applications, such as e-mail and chat.

### **5.6 Interfaces**

The LMS shall communicate over existing network circuits using only the following standard and product based protocols and TCP port numbers:

- HTTP                      Port 80
- HTTPS                     Port 443
- SQL Server               Port 1433
- Oracle Net 8              Ports 1521 & 1526

## **6.0 SECURITY**

The security architecture of MarineNet is designed to protect the information stored in the database subsystem and their transactions according to the security and privacy requirements. The LMS must operate within the security architecture of MarineNet and prevent access to unauthorized users.

### **6.1 Data Integrity**

The LMS shall identify and authenticate all users before providing services. MCIAIS will maintain data files on authorized users and provide demographic and enrollment information as required by the LMS.

Beyond normal log-in requirements for authorization, the LMS shall require a valid, authorized proctor for end-of-course tests for record to validate the identity of the student requesting the test.

The LMS privileges and information access shall be regulated by roles assigned to the user. The LMS shall protect course information, courseware and privacy information from disclosure to unauthorized individuals. All databases and server resources will require the use of a password for access.

### **6.2 Communications**

The LMS shall use Secure Socket Layer (SSL) to encrypt all communications to and from the web browser. The system shall use DoD PKI server certificates on all web servers in order to utilize SSL for secure HTTP communications.



## **7.0 SYSTEM DEVELOPMENT PLAN**

The basis for the LMS selection shall be a customizable COTS product. Testing of candidate systems will yield a recommendation for a base LMS system for use within MarineNet. The level of required customization and cost of the product to better meet Marine Corps' needs will be a determining factor in the recommendation.

## **8.0 COST FACTORS**

The cost of a LMS system will include the licensing scheme used in consideration with the population size and LRC configuration and the expected use of remote users. The licensing costs may or may not include the cost of initial training for system administrators and other users of the system. System maintenance of software may be another cost consideration.

The LMS will need some level of customization before it can be fielded for use within MarineNet. The appearance of GUI's for data entry and presentation to the student in appropriate terms and appearance will be necessary. Additional functionality may be considered if the cost of customization allows, providing benefit at a value.

## **GLOSSARY**

<b>ADO</b>	Advanced Distributed Learning
<b>AEC</b>	Automated Electronic Classroom
<b>AGR</b>	AICC Guidelines and Recommendations
<b>AICC</b>	Airline Industry CBT Committee
<b>ALC</b>	Area Learning Center
<b>ALC</b>	Area Learning Center
<b>AU</b>	Assignable Unit
<b>AU</b>	Assignable Unit
 <b>BTI</b>	 Base Telecommunications Infrastructure
 <b>CMI</b>	 Computer Managed Instruction
<b>COTS</b>	Commercial-off-the-Shelf
 <b>DLC</b>	 Distance Learning Center
<b>DLC</b>	Distance Learning Center
<b>DLRC</b>	Deployed Learning Resource Center
<b>DLRC</b>	Deployed Learning Resource Centers
<b>DOD</b>	Department of Defense
 <b>EOC</b>	 End-of-Course
 <b>FLC</b>	 Functional Learning Center
<b>FLC</b>	Functional Learning Center
<b>FRD</b>	Functional Requirements Document
 <b>HTTP</b>	 Hyper Text Transport Protocol
 <b>IDEF1X</b>	 Integration Definition for Information Modeling
<b>IEEE</b>	Institute of Electrical Engineers
<b>IMS</b>	Instructional Management System
<b>ISP</b>	Internet Service Provider
 <b>Kbps</b>	 Kilobits per second
 <b>LAN</b>	 Local Area Network
<b>LMS</b>	Learning Management System
<b>LMS</b>	Learning management System
<b>LRC</b>	Learning Resource Center
<b>LRC</b>	Learning Resource Centers
 <b>MarineNet</b>	 Marine Corps Distance Learning Network
<b>Mbps</b>	Megabytes per second
<b>MCI</b>	Marine Corps Institute

<b>MCIAIS</b>	Marine Corps Institute Automated Information System
<b>MCTFS</b>	Marine Corps Total Force System
<b>MOS</b>	Military Occupation Specialty
<b>NIPRNET</b>	Non-Secure Internet Protocol Router Network
<b>NPS</b>	Naval Postgraduate School
<b>ODBC</b>	Open Database Connectivity
<b>ORD</b>	Operational Requirements Document
<b>SCORM</b>	Sharable Courseware Object Reference Model
<b>SQL</b>	Structured Query Language
<b>TCP/IP</b>	Transmission Control Protocol/Internet Protocol
<b>TEPOP</b>	Training and Education Point-of-Presence
<b>UVR</b>	United Verification Report
<b>VTC</b>	Video Teleconferencing
<b>VTT</b>	Videoteletraining
<b>WAN</b>	Wide Area Network

## APPENDIX A

### MCIAIS INTERFACE REQUIREMENTS

This appendix defines the requirements for the interface between the Learning Management System (LMS) for the Marine Corps Distance Learning Program and other Marine Corps systems. It is intended as a definition for the implementation of those interfaces for the LMS.

#### A.1 MCIAIS Overview

MCIAIS is a central database server that handles registration, enrollment, testing, and inventory for both online and paper-based training courses administered by the Marine Corps Institute (MCI). At any one time, it contains active training information for approximately 200,000 students. It supports course enrollment, registration, testing, and paper document inventory control and management for paper-based training courses in addition to supporting MarineNet. It is the primary system with which the LMS must communicate.

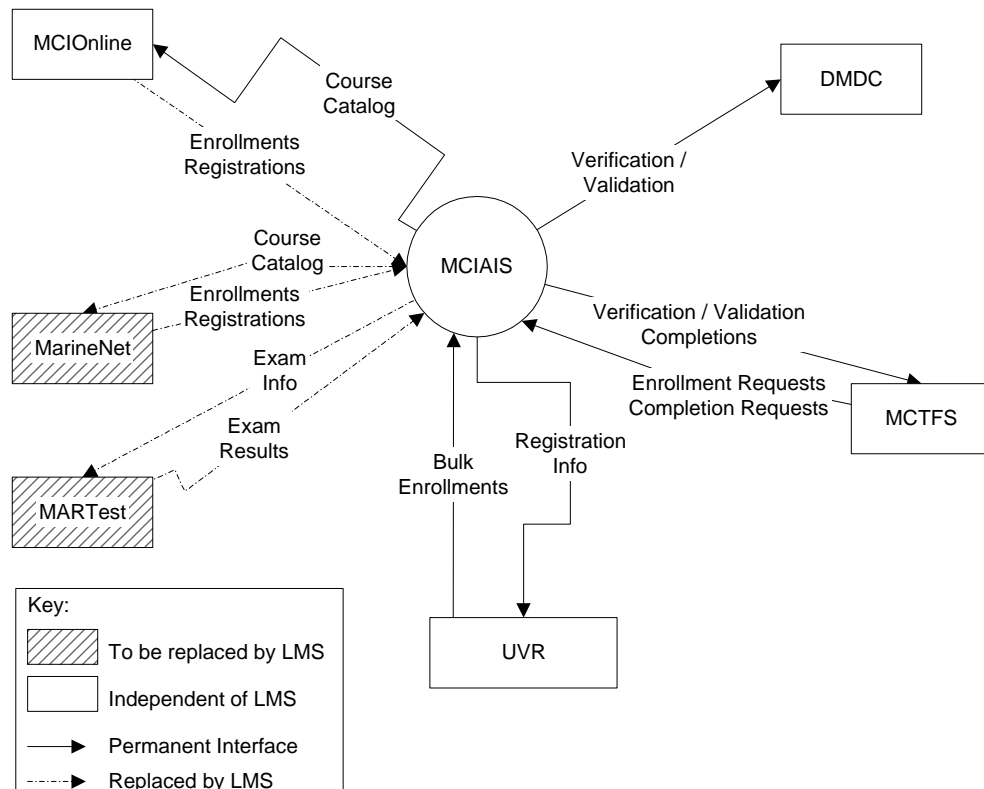


Figure A-1. MCIAIS External Interfaces

MCIAIS consists of two HP Netserver running Windows NT 4.0 Service Pack 4, Microsoft Cluster Server, and Oracle 8.04. MCIAIS has interfaces to the following external systems, as shown above in Figure A-1:

- MarineNET (LMS). This appendix defines the details of this interface.
- Unit Verification Report (UVR) - The Unit Verification Report (UVR) is a stand-alone web-based application that enables a unit's Training NCO to bulk register a group of Marines in a specific course.
- Marine Corps Institute Online (MCI Online) - MCI Online is a web site that provides numerous functions. It allows the individual student to log on and register for courses, check enrollment records, order course material, review course catalogs, check grades, etc. MCI Online also has a customer service option. MCI Online will continue to exist as an information web site, however the registration functionality will be replaced by the LMS.
- Marine Corps Total Force System (MCTFS) - The Marine Corps Total Force System (MCTFS) is a system that is located in St. Louis, MO. MCTFS stores records for every Marine. It also stores enrollment requests, completion requests, school codes, and advisories. The interface between MCIAIS and MCTFS is the major MCIAIS external link.
- Defense Manpower Data Center (DMDC) - The Defense Manpower Data Center (DMDC) is a system that is located in Monterey, CA. It maintains a list of DoD employees. This list includes Marines, active-duty personnel from other services, and other government personnel. The MCIAIS system verifies and validates students via DMDC when they register for a course.
- MARTest - MARTest is the current online prototype testing system that will be replaced by the LMS. It differs from most online testing systems because proctoring is required for all tests taken through MCIAIS. Once the test is complete, the exam results are passed back to MCIAIS. The MARTest functions are part of the requirements for the LMS. The MARTest functionality will be replaced by the LMS.

## **A.2 Interface Requirements**

This section defines the interface requirements for the LMS to MCIAIS.

### A.2.1 Network Interface

The LMS software shall access MCIAIS at hostname `mciaais.mci.usmc.mil`<sup>1</sup> with IP 205.109.20.30. The LMS software shall use standard TCP/IP protocols for communication with MCIAIS. The LMS shall use the following standard and product based protocols and TCP port numbers:

- HTTP Port 80
- HTTPS Port 443
- SQL Server Port 1433
- Oracle Net 8 Ports 1521 & 1526

### A.2.2 Data Interface

The LMS software shall be capable of interfacing with MCIAIS. This interface shall provide the necessary communications to:

- authenticate users
- obtain or update local profile information
- register and de-register for courses
- update course completion information
- view student transcripts
- print course completion certificates.

The interface shall consist of Oracle views and stored procedures. The LMS shall use a `userId` and password to be supplied through administrative channels.

The software interface to MCIAIS requires the LMS to access an external database schema. The LMS software shall not require alteration of the MCIAIS database schema. The MCIAIS database schema, as it pertains to this software, contains three key tables. This software shall have views into these tables as illustrated in Tables A-1 to A-3.

#### A.2.2.1 Customer View

The view of the MCIAIS Customer table `DLC_CUST_V` shown in Table A-1, provides this software with the official list of authorized users. (The view shown in Table A-1 is only a subset of the entire Customer table stored in MCIAIS.) The SSN field serves as the key field for MCIAIS. The fields are defined as:

- |                     |                        |
|---------------------|------------------------|
| 1. SSN <sup>2</sup> | Social Security Number |
| 2. LAST_NAME        | Last name              |
| 3. FIRST_NAME       | First name             |

---

<sup>1</sup> The hostname `mciaais.mci.usmc.mil` is currently only registered internally to the `mci.usmc.mil` domain and is not externally visible. This will be addressed before LMS fielding.

<sup>2</sup> Privacy Act information and must be protected accordingly

- |                          |   |
|--------------------------|---|
| 4. MIDDLE_INITIAL        | Middle initial, if any                                      |
| 5. ALC                   | Area Learning Center - code for the student's current TEPOP |
| 6. RANK                  | Military rank   |
| 7. PASSWORD <sup>2</sup> | Date of birth, yyyymmdd                                     |

**Table A-1. MCIAIS Customer Table View**

DLC_CUST_V	
SSN	Varchar2(10)
LAST_NAME	Not null varchar2(20)
FIRST_NAME	Not null varchar2(20)
MIDDLE_INITIAL	Varchar2(1)
ALC	Varchar2(10)
RANK	Varchar2(6)
PASSWORD	Varchar2(20)

#### A.2.2.2 Enrollment View

Table A-2 defines the characteristics of the official Student Enrollment information. It identifies which students are enrolled in which courses. The defined fields are;

- |                           |   |
|---------------------------|---|
| 8. SSN <sup>2</sup>       | Social Security Number                                      |
| 9. LAST_NAME              | Last name   |
| 10. FIRST_NAME            | First name  |
| 11. MIDDLE_INITIAL        | Middle initial, if any                                      |
| 12. ALC                   | Area Learning Center - code for the student's current TEPOP |
| 13. RANK                  | Military rank   |
| 14. PASSWORD <sup>2</sup> | Date of birth, yyyymmdd                                     |
| 15. COURSE                | Course Number   |
| 16. VERSION               | Course version ID for which the student originally enrolled |
| 17. TITLE                 | Course Title  |
| 18. STATUS                | One of 'Comp', 'Active', or 'Disenr'                        |
| 19. ACTIONDATE            | Date status last changed                                    |
| 20. SCPFINALGRADE         | Course Grade, numeric ranging from 0 to 100                 |
| 21. EXAMTYPE              | Type of exam, designates 'Paper' or 'Online'                |



**Table A-2. MCIAIS Student Enrollment Table View**

<b>DLC_STUD_CRS_V</b>	
SSN	Varchar2(10)
LAST_NAME	Not null varchar2(20)
FIRST_NAME	Not null varchar2(20)
MIDDLE_INITIAL	Varchar2(1)
ALC	Varchar2(10)
RANK	Varchar2(6)
PASSWORD	Varchar2(20)
COURSE	Varchar2(2)
VERSION	Varchar2(2)
TITLE	Varchar2(80)
STATUS	Varchar2(6)
ACTIONDATE	Date
SCPFINALGRAD E	Varchar2(6)
EXAMTYPE	Varchar2(6)

**A.2.2.3** Course information is stored in Table A-3. The fields for DLC\_COURSE\_V are:

**Table A-3. MCIAIS Course Description Table View**

<b>DLC_COURSE_V</b>	
COURSE	VARCHAR2(6)
VERSION	VARCHAR2(2)
TITLE	VARCHAR2(80)
ABBREV	VARCHAR2(20)
STUDY_HOURS	NUMBER
RESERVE_CREDITS	VARCHAR2(3)
EDUCATION_LEVEL	VARCHAR2(4)
ACCREDITED	VARCHAR2(1)
CREDIT_HOURS	VARCHAR2(3)
DESCRIPTION	VARCHAR2(1000)
DESIGNED_FOR	VARCHAR2(200)
SCHOOL_CODE	VARCHAR2(3)
PREREQUISITES	VARCHAR2(500)
MEDIA	VARCHAR2(7)
SPONS_SCHOOL	VARCHAR2(20)
STATUS	VARCHAR2(6)

1. COURSE	Course ID
2. VERSION	Alphanumeric version of course, representing revision number
3. TITLE	Full title of course
4. ABBREV	Abbreviation of course title
5. STUDY_HOURS	Number of hours to complete course
6. RESERVE_CREDITS	Number of credits earned for Reserve Retirement Credit Points
7. EDUCATION_LEVEL	Approximate education level required to complete course
8. ACCREDITED	Indicates whether a course has been accredited by the American Counsel on Education (ACE)
9. CREDIT_HOURS	Number of ACE credit hours
10. DESCRIPTION	Textual description of course
11. DESIGNED_FOR	Textual description of who the course was designed for
12. SCHOOL_CODE	Marine Corps Total Force System (MCTFS) school code
13. PREREQUISITES	Textual description of prerequisites
14. MEDIA	Media of course, one of 'Paper' or 'On Line'
15. SPONS_SCHOOL	Marine Corps formal school sponsoring course
16. STATUS	Status of course, should always be 'Open'

### **A.2.3 Functional Interface**

In this section, we discuss the operations that the LMS may invoke as remote procedure calls in the MCIAIS database.

#### **A.2.3.1 Authentication**

The LMS shall authenticate a student who is not known locally by retrieving the student information from DLC\_CUST\_V. If no information is found for a student in that table, the LMS shall call the stored procedure PROC\_DLC\_ENROLL.

The LMS shall pass PROC\_DLC\_ENROLL the following parameters shown in Table A-4.

**Table A-4. PROC\_DLC\_ENROLL Parameters**

Field	Datatype	Description
P_SSN	VARCHAR2	Social Security Number
P_ALC	VARCHAR2	Area Learning Center code (TEPOP ID)
P_STATUS	Out NUMBER	returned Status Code
P_FNAME	Out VARCHAR2	First Name
P_MIDINIT	Out VARCHAR2	Middle Initial
P_LNAME	in/out VARCHAR2	Last Name
P_DOB	In/out VARCHAR2	Date of Birth (yyyymmdd)
P_RANK	Out VARCHAR2	Student's Rank 0 = okay -30100 = invalid SSN format -30200 = invalid ALC format (USED BY DLC_ENROLL ONLY) -30300 = non-marine (USED BY DLC_ENROLL ONLY)

The function will place a status code of 0 in P\_STATUS if the student is authorized. If the student is not authorized, it will return one of the non-zero status codes. If the P\_STATUS parameter is 0 then the following will also be returned, otherwise they are undefined:

P\_FNAME  
P\_MIDINIT  
P\_LNAME  
P\_DOB  
P\_RANK

#### **A.2.3.2 Course Enrollment**

The LMS shall call the Oracle stored procedure PROC\_DLC\_REGISTER to determine if a student is eligible and has met the requirements to enroll in a course. MCIAIS will perform a series of eligibility tests and prerequisite tests not described here and return a result.

The LMS shall pass PROC\_DLC\_REGISTER the following parameters shown in Table A-5.

**Table A-5. PROC\_DLC\_REGISTER Parameters**

Field	Datatype	Description
P_SSN	VARCHAR2	Student's SSN, must be 9 digits.
P_COURSENO	VARCHAR2	Requested course for enrollment, 1-4 digits.
P_ISSUE_MATL	VARCHAR2	'Y' = Textbooks and exam sent. 'N' = Only exam sent, no textbooks.
P_STATUS	out NUMBER	Return code 0 = Success -30100 = invalid SSN format -30200 = invalid ALC format -30300 = non-marine -30400 = invalid course number -30500 = course closed -30600 = materials on hold -30700 = SSN not enrolled in CUST -30800 = Max # enrolls -30900 = Prerequisites not met -31000 = Already enrolled -31100 = Enrollment failed with Oracle Error -31200 = Address problem.

If the enrollment is successful, the view DLC\_STUD\_CRIS\_V is updated, and the value 0 is returned. If not, then the specified error value is returned.

#### **A.2.3.3 Generate Transcript**

To generate a student's unofficial transcript, the LMS shall perform a remote query against DLC\_STUD\_CRIS\_V.

#### **A.2.3.4 Determine Course Completion**

To determine if a student has completed a course, the LMS shall perform a remote query against DLC\_STUD\_CRIS\_V.

#### **A.2.3.5 Determine Course Grade**

To determine a student's final grade for a training course, the LMS shall perform a remote query against DLC\_STUD\_CRIS\_V.

### A.2.3.6 Issue Course Certificate

The LMS shall call the Oracle stored procedure PROC\_ISSUE\_CERT to determine if a student has met the requirements to complete a course. MCIAIS will perform a series of eligibility tests and prerequisite tests not described here and return a result. If the student has completed course requirements, the function returns success, otherwise an error code indicating why the certificate should not be issued.

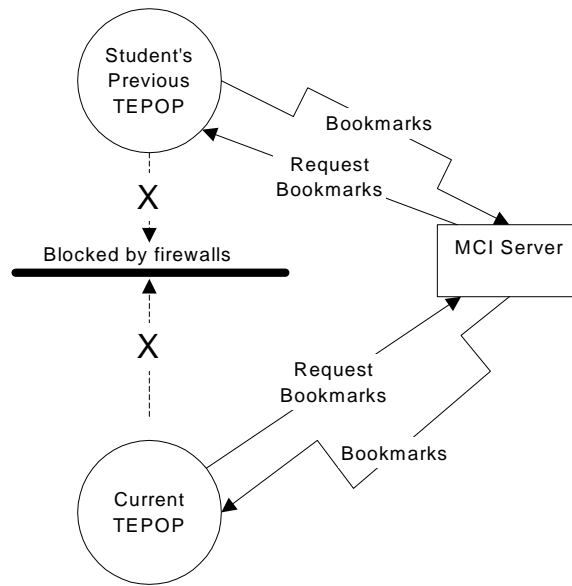
The LMS shall pass PROC\_ISSUE\_CERT the following parameters shown in Table A-6.

**Table A-6. PROC\_ISSUE\_CERT Parameters**

Field	Datatype	Description
P_SSN_ID	VARCHAR2	Social Security Number of student requesting certificate
P_CRSNO	VARCHAR2	Course identifier of course certificate is being requested for
P_CRSVER	VARCHAR2	Version of course certificate being requested
P_STATUS	out NUMBER	Return status 0 = okay -31100 = invalid SSN -31101 = invalid SSN format -31200 = SSN has no completion for specified course -31201 = invalid Course format -31301 = unspecified error

### A.2.3.7 Bookmark Operations

When a student transfers from one location to another, it is necessary to transfer student information from one TEPOP to another. All TEPOPs are expected to operate behind firewalls at each Marine Corps base, which require specific source and destination IP addresses for each possible communications path. Enabling and testing communications from each TEPOP to every other possible TEPOP is very complex. Instead, each TEPOP will communicate with a private web server at MCI. A TEPOP will request information from the private web server, which will in turn communicate with the other TEPOP. This reduces the maximum number of connections for each TEPOP to one from 66, and the number of firewall exemptions for all TEPOP which must be documented and maintained to 66 from 4356. See Figure A-2.



**Figure A-2. Bookmark Retrieval**

The next section describes the interface between the TEPOP and the MCI web server to request bookmarks, and between MCIAIS and the TEPOP to obtain the bookmarks.

Note: This interface is highly specific to the current MarineNet Block II software. The LMS is not expected to conform to this interface, however, an equivalent interface is required which does not require firewall exemptions from every TEPOP to every other TEPOP.

#### **A.2.3.7.1 Request Bookmarks**

The private web server shall be accessed at hostname `marinenetscripts.mbw.usmc.mil`, IP 192.156.46.102. The LMS shall request bookmarks by performing an HTTP GET on the URL `/gototepop.asp` with arguments as follows shown in Table A-7.

**Table A-7. Request Bookmarks HTTP Parameters**

Argument	Description
SSN	Social Security Number of student requesting certificate
ALC	The code indicating which TEPOP currently maintains the student's bookmarks.

The result is a string (HTTP Content-Type: `text/ascii`) containing the following:

- Timestamp - a string containing the current time and date.
- A repeating list of:
  - Course number – the numeric course identifier
  - <tab>
  - Bookmark - the URL of the page last visited by the student.
  - <eol>

#### **A.2.3.7.2 Provide Bookmarks**

The TEPOP shall provide a URL named `/getbookmarks.asp`. This URL will be accessed via an HTTP GET operation with a single argument, the student SSN. In response, the TEPOP shall:

1. Remove all bookmarks from storage
2. Mark the student 'Inactive' in the local student database.
3. Return a string (HTTP Content-Type: `text/ascii`) containing the following:
  - Timestamp - a string of the form [TBD] containing the current time and date.
  - A repeating list of:
    - Course number – the numeric course identifier
    - <tab>
    - Bookmark - the URL of the page last visited by the student.
    - <eol>

#### **A.2.4 Email Interface**

Some operations that require human intervention are handled by emailing a message to a specific address at MCIAIS using a standard email application. The following operations and addresses are currently defined in Table A-8.

**Table A-8. Known E-mail Addresses and Functions**

<b>Operation</b>	<b>Destination Email Address</b>	<b>Message Contents</b>
Request Formal Transcript (with seal)	<a href="mailto:ombmcissd@mbw.usmc.mil">ombmcissd@mbw.usmc.mil</a>	Text message containing up to three addresses for mailing. Earliest MCI course completion date must be included.
Correct Mailing Address	<a href="mailto:ombmcissd@mbw.usmc.mil">ombmcissd@mbw.usmc.mil</a>	Text message containing new address
Specific question or problem not related to Professional Military Education (PME) issues	<a href="mailto:ombmcissd@mbw.usmc.mil">ombmcissd@mbw.usmc.mil</a>	Text description of question or problem.
Specific question or problem related to Professional Military Education (PME) issues	ombmcipme@mbw.usmc.mil	Text description of question or problem.
Comment	<a href="mailto:mbwwebmaster@mbw.usmc.mil">mbwwebmaster@mbw.usmc.mil</a>	Text description of comment.
Error Description	<a href="mailto:mbwwebmaster@mbw.usmc.mil">mbwwebmaster@mbw.usmc.mil</a>	Text description of error.
Enhancement Request	<a href="mailto:mbwwebmaster@mbw.usmc.mil">mbwwebmaster@mbw.usmc.mil</a>	Text description of enhancement request.



## **APPENDIX B**

### **MCIAIS INTERNAL DATABASE DOCUMENTATION**

Appendix B contains a logical graphical information model of the MCIAIS database in Integration Definition for Information Modeling (IDEF1X) convention which describes the views and underlying table structures of the database as provided in Appendix A. The data model is provided for informational purposes and as background for the development of the views.